Dust Exposure and Dust Control for Navy Seabee Rock Crushing Operations

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Naval
Construction Force

The Naval Construction Force personnel, or Seabees, are the builders of the Navy. They provide responsive military construction support to the Navy, Marine Corps, and other forces, and are also capable of combat defensive operations

San Clemente Island, CA

Guam, Marianas Islands

- San Clemente Island California (whale point quarry)
  - Mobile rock crusher
- Guam (Orote point quarry)
  - Rock crusher, wash plant, concrete plant, and asphalt plant.

Whale Point Quarry
San Clemente Island, California

Mineral Processing Operations San Clemente Isla

- Company size detachment
  - –1 Officer
  - –1 Chief
  - –30-50 Seabees
- Six Month Deployment
- Various Island Construction Projects
- Quarry Operations
- Operates Portable Rock crushing unit

ONSTED

Exposure / Health Affects

- Mineral Dust exposure
  - Irritation to eyes, ears, nose, throat and skin.
  - Long-term exposure may lead to various respiratory diseases.

- Dust Composition
  - Does not pose the same degree of health hazard.
  - Chemical / Mineralogical composition
  - Airborne concentration
  - Particle size and shape

- Respiratory diseases
  - Silicosis and Asbestosis.

Exposure / Health Affects

Silicosis: Fibrotic lung disease which is a result of inhaling respirable silica dust.

- Nodular fibrosis or scar tissue formation
- No cure for the disease.
- Exposure
  - Chronic ~ 20 Years
  - Acute ~ 1-3 Years
  - Accelerated ~ 5-15 Years
- Advanced stages are progressive

Exposure / Health Affects

Asbestosis: Progressive disease that affects the alveoli by inhalation of asbestos fibers.

- Scar tissue formation / Wall thickening
- Progressive / Irreversible
- Latency period: 20 Years
- No Cure

Stressors Evaluated

Crystalline Silica

- Quartz (Most common) OSHA PEL: 0.1 mg/m³
- Cristobalite (1/2 PEL of Quartz) OSHA PEL: 0.05 mg/m³

Particulates Not Otherwise Specified (PNOS) “Nuisance Dust”

Noise Exposure

Sampling Methods

- Respirable Dust
  - SKC Aluminum Cyclone
  - Flow Rate 2.5 LPM
  - 37mm PVC Tared filter
  - Full shift

- Inhalable Dust
  - IOM Sampler
  - Flow rate 2.0 LPM
  - 25mm PVC tared filter
  - Full shift

Sampling Methods

- Total Dust
  - 37mm (closed Face) PVC Tarred cassett
  - Flow rate 2.5 LPM
  - Full shift

- Noise Dosimetry

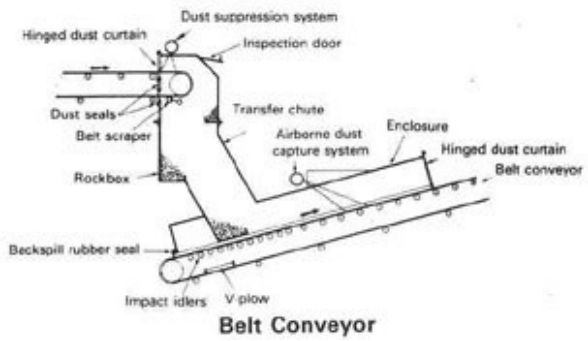
Preliminary Monitoring Results

Worker	Inhalable Particulate (mg/m³)		Respirable Cristobalite (mg/m³)		Respirable Quartz (mg/m³)		Noise (dBA)
	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2	Day 2
Primary Operator	<	<	<	<	<	<	95
Secondary Operator	332 (156) *	65 (49)*	0.106 (0.032) *	0.11 (0.059) *	<	<	94
Supervisor	<	<	<	<	<	<	100
Bull Dozer Operator	<	<	<	<	<	<	89

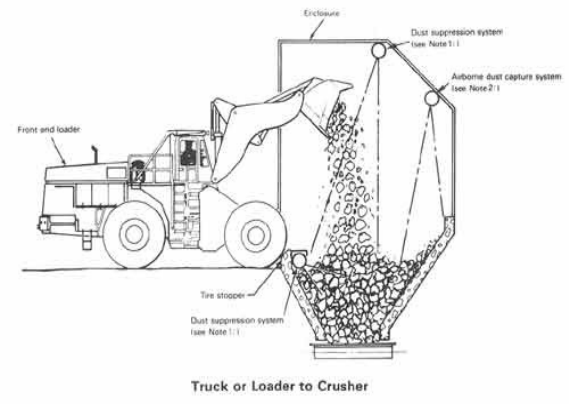
Note: The workers wore the monitoring devices for the entire duration of the operation. Values in black-colored type represent TWA results for the time period monitored.

* 8 Hour TWA Result - calculated based on the assumption of “zero exposure” to the monitored stressor during the unsampled portion of the workshift.

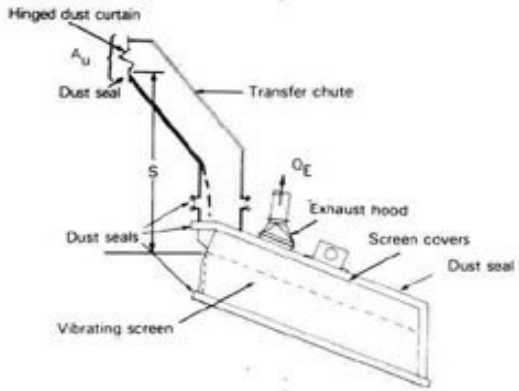
Control Methods



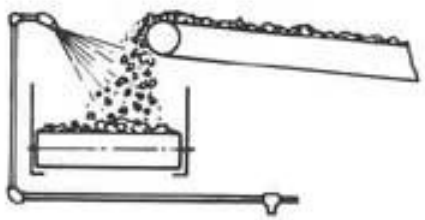
Belt Conveyor



Truck or Loader to Crusher



Vibrating Screen


Wet Dust Suppression System

Control Methods

Wet Methods

Airborne Dust Capture - Airborne dust particles are sprayed with atomized water. Dust particles collide with water droplets forming agglomerates which settle out of the air.

Wet Dust Suppression – Water sprays wet material so it generates less dust.

Control Methods

Local Exhaust Ventilation – An exhaust hood captures dust emissions at the source, ductwork transports the dusty air to a dust collector. A fan and motor provide the necessary exhaust volume and energy.

Control Methods

Enclosures- Enclosing a dust source with shrouds, covers, curtains, chutes, or skirting, contains emissions or allows an existing dust control system to operate more efficiently.

Summary

Mineral processing operations present many potential health and safety risks.

Other concerns include slip, trip, fall, pinching and crushing hazards, as well as exposures to hazardous noise and whole-body vibration, as operators stand on vibrating machinery platforms.

Operations warrant detailed health and safety evaluations by our community.

Questions